1 **WITH SIGNAL, INDICATOR OR INSPECTION MEANS**
2 **CUTOFF OR CONTROL AFTER PREDETERMINED NUMBER OF CYCLES OR REVOLUTIONS**
3 **JET CONTROL TYPE**
4 R **HYDRO-PNEUMATIC**
4 A .With float mechanism
5 **WORKING MEMBER MOVED BY STORED MOTIVE FLUID CHARGE**
6 **FLUID SUPPLY THROUGH DIVERSE PATHS TO SINGLE EXPANSIBLE CHAMBER**
6.5 .Three or more cylinders arranged in parallel, radial or conical relationship with rotary transmission axis
7 .Selective cyclic and noncyclic operation or parking
8 .Semi-compound type
9 ..Changeable by shiftable distributor
10 ..With condition responsive change-over valve
11 .Changeable from multiple expansion to simple operation
12 .Cyclically operable motor with port reversing
13 ..By shifting distributor seat
14 ..By shifting distributor
15 ..Selector valve between distributor and motor
16 .Drifting or coasting on lower pressure
17 ..With speed responsive cutoff of drifting fluid
18 ..Pressure control of drifting fluid
19 .Diverse paths used to control extent of working member travel
20 .Position responsive
21 ..Rotating working member or chamber
22 ..Preliminary inlet to contracting chamber (e.g., cushioning)
23 ...By bypassing from expanding chamber (399)
24 ..Additional inlet path opened in response to position
25 ...Working member or part carried thereby uncovers inlet port
26 ....First path has check valve or selectively adjustable throttle
27 ..Plural simultaneous paths, one cutoff in response to position
28 .Second path activated in response to pressure or flow in first path
29 ..By pressure rise in first path
30 .Serially arranged reversing valves
31 .One path includes restriction
32 .Activation of one path disables second path
33 ..Pressure operated
34 **SINGLE ACTING, CHANGEABLE TO OR FROM DOUBLE ACTING**
35 **INDEPENDENTLY OPERATED TIMER, DELAY, PATTERN OR CYCLIC CONTROL**
36 .Of independently movable working members
37 .Pattern or template control
38 .Fluid actuated valve with volume chamber delay means
39 .Independent distributor actuation for cyclic control
40 ..Fluid actuated distributor motor
41 **WITH CORRELATED CONTROL OF MOTIVE FLUID AND LOCKING MEANS**
42 .By electrical control means
43 .Working member position control of motive fluid and locking means
44 .Sequential operation of locking means and motive fluid control
45 .Common or interconnected valve means control motive fluid and fluid for locking means
46 **WITH INTERRELATED CONTROL OF MOTIVE FLUID AND LUBRICANT**
47 **CONSTANTLY APPLIED MOTIVE FLUID WITH CONTROLLED VENTING**
48 .Plural separately controlled vents
49 .Fluid vented through working member
50 .Cyclically operable
51 .Motive fluid constantly applied to and vented from opposed chambers

52 **CONSTANTLY OPEN THROTTLED EXHAUST WITH CONTROLLED MOTIVE FLUID SUPPLY**
53 **ENGINE ROTATING OR STARTING TYPE**
54 **CONVERTIBLE; OR CHANGEABLE BY DISASSEMBLY OR ASSEMBLY**
55 **COMBINED**
59 **TORQUE RESPONSIVE MOTIVE FLUID CONTROL**
61 **ROTARY AND RECIPROCATING WORKING MEMBERS**
151 **SERIALLY FORMED EXPANDING WORKING CHAMBERS (E.G., ENDLESS)**
152 **MULTIPLE EXPANSION**
153 .Duplex
154 ..Cut-off or reversing
155 .With fluid actuated distributor
156 .Concentric working chambers
157 .Relative valving adjustment between high and low pressure working chambers
158 ..Adjustment for valving for plural chambers
159 .Expansion between relatively movable working members
160 ..Double acting high and low pressure working members
161 ..Fluid acts on each working member in single direction
162 ...High and low pressure faces on each working member
163 .Fluid expanded through working member
164 .Dual, rigidly connected high and low pressure faces
165 **APPLICATION OF MOTIVE FLUID AT DIFFERENT PRESSURES TO OPPOSED WORKING MEMBER FACES**
166 .Double acting motor reversed by pressure variation of motive fluid
167 R **EXTENSION OF UNIT HAVING SEPARATELY CONTROLLED WORKING CHAMBERS EQUALS SUM OF INDIVIDUAL CHAMBER EXTENSIONS**
168 .Control of motive fluid for one working member in response to position of second
167 A .Vane
472 **THREE OR MORE CYLINDERS ARRANGED IN PARALLEL RADIAL OR CONICAL RELATIONSHIP WITH ROTARY TRANSMISSION AXIS**
473 .Condition responsive control of drive transmission
474 .Separate fluid supply or discharge paths
475 .Having yieldable drive transmission
476 .Separate motive fluid control for each working chamber
477 ..Each piston acts as valve for different working chamber
478 ..Means varies cyclic relation between reciprocating member and control valve therefor
479 ..Control by moving cylinder or liner
480 ..Mechanically actuated valves
481 ...Radial cylinders
482 .Means varies cyclic relation between reciprocating member and control valve therefor
483 ..By adjustment of transmission or reaction element
484 .Control valve seating surface contact maintained by fluid pressure bias
485 ..Disc valve
486 .Motive fluid bypass to or from assembly
487 ..Separate passage directs motive fluid to or from valve interface
488 ..Fluid conducting passage disposed within piston
489 ..Valved
490 .Motive fluid supply or discharge through piston
491 .Radially disposed cylinders
492 ..Plural banks
493 ..Rigidly connected pistons reciprocate within rigidly connected cylinders
494 ..Cylinders and pistons form or coact with respective common elements having limited relative rotary movement
495 ...Cylinders or pistons pinned to common element
496 ..Positive bidirectional drive or reciprocating members
497 ..Stroke control
498 ..Cooperating valve ports in cylinder and relatively movable central member

499 .Cylinders parallel to rotation axis
500 ..Plural angularly disposed cylinder banks
501 ..Cylinders contain plural oppositely movable pistons
502 ..Including plural axially spaced working chambers (e.g., double-acting working members)
503 ..Rotary spool valve
504 ..Stroke control
505 ...By varying reaction plate inclination relative to cylinder axes
506 ....Motor operated
507 ..Positive bidirectional drive of reciprocating members
169 **SINGLE CHAMBER FORMED BY MUTUALLY RELATIVELY MOVABLE CYLINDER, SLEEVE AND PISTON**
170 R **RELATIVELY MOVABLE WORKING MEMBERS WITH ONE HAVING MOTIVE FLUID CONTROLLED BY, MOVABLY INTERCONNECTED WITH OR MOVED BY ANOTHER**
171 .Synchronizing in response to sensed difference in positions
172 .One working member oppositely biased by another
173 .One working member forms movable chamber for another
174 .With connection to relatively movable output member disposed between spaced unitary end faces
176 .Moving cylinders
177 .Oscillating working members
178 .Single valve unit controlling plural working chambers
179 ..Oscillating valve
180 ..Rotary valve
181 .Interconnected working members in communicating chamber portions
182 .Means connecting working members actuates common part controlling motive fluid for the members
183 .With means interconnecting working members to cause relative motion
184 ..Working member covers port to control motive fluid
185 ..Motive fluid control by pitman swing or intermittent contact with working member
186 ..Connection includes toothed gearing or rocking lever
187 ..Means varies cyclic relation between working member and control valve therefor
188 ..Motive fluid control actuator includes cam or crank rigid with means connecting working members
189 R .Position of one working member controls motive fluid for another
190 ..Changeable to plural self-controlled working members
191 ..Each cyclically controls another (e.g., duplex)
192 ...With three or more working members
193 ...Fluid operated valve controlled by relatively movable working member
194 ...Rotating output shaft type (e.g., locomotive or reversing means)
195 ...With self-control
189 A ..Piston or rod directly valves passage
170 MP .Mine props
196 **MOVING CYLINDER**
197 .Plural rigidly connected rotary cylinders
206 .With integral exterior working face
207 ..Both faces urged in single direction
208 ...Fluid to exterior face controlled by motive fluid pressure
209 ...Fluid to exterior face controlled by cylinder position
210 .Oscillating cylinder
211 ..Cooperating valve ports in cylinder and fixed member
212 ...Ported end bearing
213 ...Ported trunnion
214 ...Ported arcuate slide face on which cylinder moves
215 ..Cylinder carried valve operated by fixed actuator

216 R .Cylinder and piston have relative reciprocation on fixed axis
217 ..Reciprocating piston and cylinder
216 A ..Moving cylinder having follow-up
216 B ..Cyclical moving cylinder
218 **CYCLICALLY OPERABLE**
219 .With dwell
220 .With condition responsive stop means
221 ..Speed
222 .Distributor in piston (422)
223 ..Oscillating piston (e.g., vane)
224 ..Distributor establishes communication between opposite faces of piston
225 ..Piston traverses pilot port to control distributor motor motive fluid
226 ..Communication into piston through peripheral port
227 ...Port controlled by piston position
228 ..Piston carries separate inlet and exhaust valves
229 ..Distributor operated by abutment with cylinder head
230 .Codirectional separately supplied working members
231 ..One working member supply is distributor controlled
232 .Valveless distribution
233 ..Distribution by reciprocating working member moving about an axis
234 ..Working member formed to provide internal fluid flow passage
235 .Working chamber receives controlled motive fluid supply from opposed chamber having constant supply (321) (417)
236 .Multiple exhaust passages (e.g., compression control)
237 ..Exhaust valve has separate valve controlled second exhaust passage therein
238 ...Pressure controlled second passage
239 ..Distributor for inlet or first exhaust controls second exhaust passage
240 ..Fluid pressure actuated valve for second exhaust passage
241 ...Compression actuated discharge to motive fluid supply
242 ...Exhaust pressure controlled
243 ..Working member controlled exhaust port with valved second exhaust passage
244 ..Controlled by separate relatively movable valves
245 .Clearance control
246 .Correlated throttle valve and distributor
247 .Timing control by relative adjustment of plural movable fluid control elements
248 ..Electrical adjustment
249 ..With relative adjustment of plural adjustable fluid control elements
250 ...Adjustable inlet and exhaust events
251 ....With adjustable release and compression events
252 ..Cut off adjustable relative to admission
253 ...Inlet controlled by relatively cyclically moved elements
254 ....Biased cut off with adjustable trip
255 ....Adjustable fluid control for fluid actuated cut off
256 ....Cut off adjustable relative to reciprocating admission element
257 .....Oscillating admission element
258 .....Arcuate adjustment of cut off
259 .....Cut off adjustable codirectional with admission element movement
260 ...Biased inlet valve with adjustable tripping means
261 ....Inlet valve movable about an axis
262 ...Adjustable cam or cam follower actuated inlet valve
263 ...Adjustable fluid control for fluid actuated inlet valve
264 .Relatively movable serial distributors
265 .Relatively movable inlet and exhaust valves
266 ..Oscillating working member

267 ..Lost motion drive from inlet to exhaust valve
268 ..Exhaust valve closed or held closed by inlet fluid (442)
269 ..Biased valve with trip
270 ..Inlet and exhaust valve movable about an axis
271 ..Reciprocating inlet and exhaust valves
272 ...Codirectional with working member movement
273 ....Axially seating valves
274 .With independent throttle adjustment for one side of double-acting motor
275 .Electrically or magnetically actuated or adjusted distributor (459)
276 .Distributor forms traversed movable portion of working chamber wall (423)
277 .Adjustable working member reversal position (e.g., stroke control)
278 ..Selective diverse supply or exhaust paths for distributor motor
279 ..Adjustable lost motion connection
280 .Pulsator-actuated distributor (460)
281 .Working member controlled motive fluid for distributor motor
282 ..Fluid supply through diverse paths to distributor motor chamber
283 ...Path controlled by independently operable means
284 ..Independent means to adjust distributor motor supply or exhaust passage
285 ...Separately adjusts one chamber of double-acting distributor motor
286 ..Distributor or distributor motor mechanically moved cyclically to control actuating fluid for distributor motor
287 ...Movement of relatively movable pilot mechanically moves distributor
288 ...Distributor motor mechanically moved about axis
289 ..Adjustable means to retard or lock distributor motor
290 ..Working member traverses pilot port in working chamber side wall
291 ...Port controls separate motor for intermediate pilot valve
292 ....Distributor controls passage from port
293 ...With passage from port controlled by pilot valve
294 ....Pilot valve operated by separately controlled fluid motor
295 ...Plural ports control relatively movable distributor motors
296 ...Constantly open exhaust from distributor working chamber
297 ...With passage for pilot fluid in working member
298 ....Working member passage supplies distributor motive fluid
299 ...With distributor reversal by fluid compressed by working member
300 ...With distributor reversal by constantly supplied motive fluid
301 ...With control of distributor motor supply or exhaust port by distributor working member
302 ...Pilot port relieved into working chamber having working member controlled exhaust port
303 ..Working member adapted to directly mechanically reverse distributor
304 ..Pilot valve controlled distributor motor (461)
305 ...Plural pilot valves
306 ....Independent
307 ...Pilot valve relieves constantly supplied distributor motor fluid
308 ...Fluid-operated pilot valve
309 ...With distributor motor reversal by constantly applied fluid pressure
310 ...Pilot valve moves about an axis
311 ...Pilot valve moves laterally relative to working member reciprocatory path

312 ...Distributor motor working member is valve seat for pilot valve
313 ...Pilot valve actuator extends into working chamber
314 ...Working member reverses pilot through part movable relative to both
315 ..Distributor moves about an axis
316 ..Distributor moves laterally relative to working member reciprocatory path
317 ..Working member compresses fluid to reverse distributor
318 ..Motive fluid build-up at end of working stroke reverses distributor
319 ..Working member traverses pilot passage to control distributor motor
320 ...Port in piston between opposed working faces
321 .Motive fluid constantly applied to one working member face (235) (417)
322 .With independently operable means to lock distributor
323 .Relatively movable distributors for opposed working chambers
324 ..Distributor moves about an axis
325 .Working member controlled inlet or exhaust port (e.g., semi-valveless)
326 .Distributor moves transverse and parallel to same line
327 .Distributor moves about axis parallel to working member reciprocatory path
328 .Distributor peripherally engages (1) working chamber wall, or (2) cylinder between opposed working faces
329 .Distributor located in cylinder between spaced working faces
330 .With independently operable means to move or means to adjust movement of distributor
331 ..Means adjusts motion transmission from working member to distributor
332 ...Adjusting means comprises motor
333 ...Speed controlled
334 ...To reverse direction of rotation of interposed shaft
335 .With throttle valve or distributor throttle adjustment
336 ..Speed controlled
337 .With means independent of distributor reversing parts to cyclically hold distributor
338 ..Positive hold (e.g., tripped type)
339 .Oscillating working member
340 ..Distributor reversed by rotated part
341 R .Distributor actuator extends into working chamber
342 ..Axially slidable through working face
343 ..Moves laterally relative to working member reciprocatory path
341 A ..Valves in partition between tandem pistons
344 .Biasing means moves distributor after predetermined travel (i.e., snap action)
345 ..Distributor moves about axis
346 ..Spring biased
347 ...Coil spring moves laterally relative to coil axis
348 .Distributor actuator between space piston faces
349 ..Distributor moves about axis
350 .Working member reverses distributor through part movable relative to both
351 ..Meshing rotary gear
352 ..Distributor moves about axis
353 ..Distributor moves laterally relative to working member reciprocatory path
354 ..Rotated part
355 **CUTOFF AFTER SINGLE COMPLETE CYCLE**
356 .Reversal responsive to motive fluid pressure change
357 **SELECTIVELY USABLE OR POSITIONABLE WORKING MEMBER CONTROLLED VENT IN CHAMBER WALL (402)**
358 R **WORKING MEMBER POSITION FEEDBACK TO MOTIVE FLUID CONTROL**
359 .Regenerative or positive feedback type
360 .With safety means operable upon input signal loss

361 .Electrical input and feedback signal means (459)
362 ..Means provides incremental movements (e.g., stepper type)
363 R ..Follower type
363 A ...Fail safe control
364 .With means to vary feedback signal in response to rate of working member movement
365 .With main valve position feedback to pilot valve
366 .Speed governor controlled input signal (458)
367 .Plural input signal means for single motor valve (453)
368 .Follower type
369.1 ..With relatively movable working and output members reacting on input member
369.2 ...Rubber block reaction means
369.3 ....And transverse valve key
369.4 ...Lever reaction means
370 ..With motor chamber pressure reaction on valve
371 ...With valve means limiting reaction pressure
372 ...Spring-loaded valve
373 ....With lost motion between input and reaction member
374 ..Plural movable valve parts
375 R ...Valve part moves about an axis
375 A ....Torsion bar
376 R ...One movable part unitary with working member
377 ....Lost motion linkage connecting valve, load and working member
378 ....Axially movable spool-type valve
376 A ....Vane
379 ..Disproportional rate of response
380 ..Screw and follower (e.g., nut)
381 ..Differential gearing
382 ..Cam and follower
383 ..Cable
384 ..Floating link
385 .Bias-type input and feedback signal means
386 ..Feedback bias means adjustable
387 ..Spring-type feedback bias means
388 .Fluid operated
389 .Adjustable
358 A .Valve locking means
390 **POSITION MAINTAINING TYPE**
391 R **WITH ALTERNATIVE MANUAL ACTUATION OF LOAD**
391 A .Alternate pedal positions
392 **WORKING MEMBER POSITION RESPONSIVE MOTIVE FLUID CONTROL**
393 .Position initiated timing or delay means
394 .Working member carries part within working chamber which controls port in chamber end wall
395 ..Part movable with respect to working member
396 ..Part forms throttle member
397 .Alternate control of inlet and exhaust for same chamber at opposite ends of stroke
398 .Simultaneous control of inlet and exhaust of same chamber
399 .Bypassing between expanding chamber and closed or throttled contracting chamber (e.g., cushioning) (23)
400 .Venting expanding chamber
401 ..Through working member
402 ..Working member overrides exhaust port (357)
403 .Position controls actuating fluid for valve
404 .Exhaust control
405 ..Throttling (e.g., cushioning)
406 ...Exhaust valve with bleed passage therein
407 ...By successively controlling or controlling less than all of plural exhaust passages
408 ....Working member covers exhaust port (409)
409 ..Working member covers exhaust port in contracting chamber (408)
410 .Working member controls relatively movable inlet valve
508 **PLURAL RELATIVELY MOVABLE OR RIGIDLY INTERCONNECTED WORKING MEMBERS**
509 .Having (1) stand-by or (2) redundant means enabling load to be driven upon failure of primary load moving means
510 ..Stand-by means utilizes an auxiliary motive fluid source for another working member to drive same load

511 .Condition responsive means for modifying working member operation
512 ..Condition is that of a load driven by a working member other than working member having its operation modified
513 ..Condition is position of fluid control member of motor other than motor whose operation is modified
514 ..Pressure responsive valve divides motive fluid between motors
515 ...For synchronization of motors
516 ...To give one motor priority to motive fluid over another
517 ..Condition sensed is working member speed or working fluid pressure of another motor (i.e., fluid pressure or flow to or from expansible chamber of the other motor)
518 ..Motive fluid control valve responsive to pressure in supply line to or exhaust line from motor which it modifies
519 .With means for selectively changing the speed or force exerted on load by the selective application of motive fluid in a single direction to one or more working members
520 .Motors connected in series
521 .Separate valve means actuatable by a common nonmanual actuator or separately actuatable means with common manual actuator
522 ..With means to independently actuate valve means
523 ..Simultaneously actuated separate valve means
524 ..Successive actuation of separate valve means
525 .With means to control the working fluid to one working member for movement relative to another without controlling the working fluid to the other working member by said means
526 ..With multiway valve in series with control means
527 ..Valve controlled by remote means (e.g., radio, electromagnetic, etc.)
528 ..Control means is fluid pressure operated valve
529 ...Fluid pressure operated valve controlled by a pilot valve
530 ..Control means includes separate control valves for each working member
531 ...With additional control valve in series with at least one separate control valve in supply line to one of motors
532 .With means for proportioning motive fluid supply to plural motors
533 .Single valve for plural rigidly connected working members
534 .Single valve for relatively movable working members driving common load
535 .Relatively movable working members of unequal cross-sectional areas
536 .Single valve for relatively movable working members
415 **DIFFERENTIAL**
416 .Opposing pressure applied by bypassing
417 R .Motive fluid constantly applied to one working member face (235) (321)
417 A ..Staplers having two diameter pistons
418 **WITH MOTIVE FLUID VALVE**
419 .Responsive to (1) motive fluid temperature or state, or (2) motor position or orientation
420 .Contracting chamber exhaust valve controlled by expanding chamber pressure or flow
421 .Expanding chamber inlet controlled by contracting chamber pressure or flow
422 .Valved piston (222)
423 .Valve part forms traversed movable portion of working chamber wall (276)
424 .Two hand control
425 ..With motor-controlled holding means for valve
426 .With fluid pressure holding means for valve
427 .Plural manual control stations
428 .Manual control carried on or operated from load or output element

429 .Dither valve
430 .Valve parts continuously relatively moved for nonvalving function
431 .Continuous motive fluid flow through chamber in motor idle condition
432 .Inlet check valve with means for disconnectable supply line (468)
433 .Both inlet and exhaust controlled by motive fluid pressure in supply line or chamber
434 ..With manual valve actuating means responsive to motive fluid pressure (e.g., "feel")
435 .Controlled by rate of movement of working member
436 .Inlet fluid supplemented by controlled fluid pressurized in opposed contracting chamber
437 .Independent control of bypass between opposed working chambers
438 ..Held closed by motive fluid pressure
439 ...Bypass through supply line
440 .For exhausting contracting working chamber to expanding opposed nonworking
441 .With ambient fluid inlet valve to expanding working chamber
442 .Self-opening exhaust valve held closed by inlet pressure (268)
443 .To provide unequal inlet and exhaust flow rates to single working chamber
444 .Relatively movable serial valves
445 ..Stop valve between working chamber and inlet and exhaust valve
446 ..Including motive fluid pressure or flow responsive valve (468)
447 ...Between working chamber and inlet and exhaust valve
448 ..In supply path
449 .Plural separately controlled waste passages for single working chamber
450 ..One passage controlled by inlet and exhaust valve
451 ...Another passage controlled by motive fluid pressure or flow responsive valve (468)
452 ..One passage controlled by motive fluid pressure or flow-responsive valve (468)
453 .Plural actuators for single valve means (367)
454 .Relatively movable inlet and exhaust valves for single working chamber
455 ..One valve forms unitary part of valve controlling opposed working chamber
456 ..One valve moves about an axis
457 ..Single actuating means moves both valves
458 .Speed governor operated (366)
459 .Electrically operated (275) (361)
460 .Pulsator actuator for valve (280)
461 .Pilot valve (304)
462 .For double-acting motor
463 ..With means to provide unequal flow rates to or from opposed working chambers
464 ..Means to simultaneously open working chambers to inlet or exhaust
465 ..Relatively movable unitary inlet and exhaust valves for opposed working chambers
466 ..Unitary inlet and exhaust valve means for opposed working chambers
467 ...Valve means moves about an axis
468 .Self-acting valve (432) (446) (451) (452)
469 .Unitary inlet and exhaust valve for single working chamber
470 ..Valve moves about an axis
471 **MISCELLANEOUS (E.G., METHODS)**

FOREIGN ART COLLECTIONS

FOR **CLASS-RELATED FOREIGN DOCUMENTS**

DIGESTS

DIG 1 **DIGITAL**
DIG 2 **EXHAUST THROTTLED MOTOR CONTROL**

DIG 3 **LARGE AREA VALVE**
DIG 4 **MAGNETS**